EXAMINING THE LATITUDINAL VARIATION OF PRE-SERVICE TEACHERS' LEARNING STYLE PROFILES

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ABSTRACT: The idea of learning styles being an important factor over the achievement of the students has recently gained popularity. However, the results of both domestic and foreign studies that have investigated the learning styles in terms of various variables are quite different from each other, yielding that there is no consistency in the literature. This descriptive study aims to determine the latitudinal variation of the learning styles of the pre-service teachers and examine the learning style profiles with regard to various variables. The data were collected from 366 undergraduate students who are enrolled at the Faculty of Education in a state university in western region of Black sea. In order to collect data, "Kolb Learning Style Inventory" and "Personal Information Form" have been used. Research data were analysed by using frequency, percentage, crosstabs and Chi-square test. In order to measure the magnitude of the effect that is found by chi-square test, Phi Cramer's V test was applied. The findings revealed that 56.8% of pre-service teachers have dominant learning styles as diverger; 28.1% of them as assimilator; 11.5% of them as accomodator and 3.6% of them as converger. Moreover, it has been found that there is a weak but statistically significant relationship between pre-service teachers' grade levels and learning styles. The study also indicated that the department, gender, parental schooling, field tendencies and daily study time have no significant effects on the learning style preferences of pre-service teachers. This study adds to the literature in that it questions consistency among the previous results of the studies. It may be suggested that new studies may be conducted using more variables to reveal different relationships and different data collection tools such as qualitative ones to shed light on these relationships. Furthermore, the practitioners may take into consideration the learning styles of the students, especially in different grade levels.

Keywords: Learning, learning styles, pre-service teachers, grade level

ÖĞRETMEN ADAYLARININ ÖĞRENME STİLİ PROFİLLERİNİN ENLEMSEL OLARAK İNCELENMESİ

ÖZET: Öğretim sürecinde kişisel farklılıkların dikkate alınmasına yönelik olarak özellikle son yıllarda, öğrencilerin öğrenme stillerinin akademik başarılarında önemli bir belirleyici faktör olduğu düşüncesi giderek popüler hale gelmiştir. Yerli ve yabancı literatür incelendiğinde, öğrenme stillerinin çeşitli değişkenler açısından incelenmesi sonucu elde edilen bulgular üzerinde bir birliktelik olmadığı görülmektedir. Bu tarama çalışmasının amacı, öğretmen adaylarının öğrenme stillerinin enlemsel olarak değişimlerini belirlemek ve öğrenme stili profillerini çeşitli değişkenlere göre incelemektir. Çalışma Batı Karadeniz Bölgesi'nde bulunan bir devlet üniversitesinin eğitim fakültesinde öğrenim görmekte olan 366 öğrencinin katılımıyla gerçekleştirilmiştir. Çalışmada veri toplama aracı olarak "Kolb Öğrenme Stilleri Envanteri" ve "Kişisel Bilgi Formu" kullanılmıştır. Araştırma verileri frekans, yüzde, çapraz tablo yardımıyla ve Ki-kare testiyle analiz edilmiştir. Ki-kare testi sonucunda bulunan anlamlı ilişkinin etki kuvvetini ölçmek için Phi Cramer's V testi uygulanmıştır. Çalışma sonucunda öğretmen adaylarının %56.8'inin baskın öğrenme stilinin değiştiren; %28.1'in özümseyen; %11.5'inin yerleştiren ve %3.6'sının ayrıştıran olduğu sonucuna ulaşılmıştır. Ayrıca, öğretmen adaylarının öğrenme stili tercihleri ile sınıf seviyeleri arasında zayıf ama istatistiksel olarak anlamlı ilişki bulunmuştur. Diğer yandan, öğretmen adaylarının öğrenme stillerinin bölüme, cinsiyete, anne ve baba eğitim durumlarına, kendilerini yatkın hissettikleri alan türüne ve günlük ders çalışma sürelerine göre anlamlı farklılık göstermediği sonucuna ulaşılmıştır. Bu çalışmanın sonuçları, geçmişte yapılan çalışmaların tutarlılıklarını sorgulamak suretiyle literatüre katkıda bulunmaktadır. Farklı ilişkilerin ortaya konulması amacıyla daha fazla değişkenle ve bu ilişkilere açıklık getirilmesi adına da nitel veri toplama araçlarıyla yeni çalışmaların yapılması önerilebilir. Bunun ötesinde, eğitimciler öğretim sürecinde, özellikle farklı sınıf düzeylerindeki öğrencilerin farklı öğrenme stillerini dikkate alabilirler.

Anahtar Kelimeler: Öğrenme, öğrenme stilleri, öğretmen adayları, sınıf düzeyi

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INTRODUCTION

Learning is a process that combines a variety of different phenomenon. It means both change of the behavior as well as one's perception of the experience. Cognitive psychology is, one of the various approaches of how individuals learn, especially interested in how the information is perceived, learnt, remembered and processed by a person (Sternberg, & Sternberg, 2012). The constructivist approach to learning is based on cognitive learning theory and claims that learning is associated with the present knowledge and perception. It also emphasizes the interaction process between individual's mental models and interpretation of the personal experience (Taber, 2011). In parallel with these approaches and developments, constructivist approach encouraging the learner to be more active and responsible in learning situations has been quite popular in educational sciences. Constructivist approach in learning places the students in the center of the learning process and suggests that learners should construct the information by associating the prior knowledge and experiences with new ones. Hence, teachers are expected to employ this thought to identify the learning chracteristics of the students and to apply the student-centered approach (Collins, 2002). Research has shown that preparing the teaching materials by taking into account of the different learning needs is favourable for the students (Moghadam, Bahrami, Por, & Sadatizadeh., 2015). Thereby, it can be seen as important for teachers to be aware of the cognitive and personal differences among students using their learning style preferences to be able to apply the instructional activities and the lessons according to different learning features of the students (Buaraphan, 2015). Representing the lesson by considering the personal characteristics and differences of the students may help them to be more active and concentrated in the classroom. One could state that students who participate in learning process actively can have a higher chance to be successful because they feel responsible for their achievement and embrace the learning process more. Research indicates that students who spend more time and exert more effort for the learning process will embrace the classroom experience more fully, keep the knowledge longer and be more persistent on completing the homeworks and tasks (Hartman, 1995). Especially over the last few years, thought of learning styles of the students being one of the important defining factors of the academic achievement have become more popular towards taking in consideration of individual differences in education (Brunton, 2015; Chermahini, Ghanbari, & Talab, 2013; Fayombo, 2015; Vaishnav, 2013; Worley-Davis, 2011).

Even though its roots are much older, number of research on learning styles and researchers studying the field of learning styles have increased dramatically over the last 50 years (Cassidy, 2004). Following Scott Thompson's statement (1979) "the ability to map learning styles is the most scientific way we know to individualize instruction" (as cited in Dunn, 1984, p.10), several research have shown that learning style based instruction increased student success drastically. However, there is no consensus on the definiton of learning style concept and every researcher has a distinctive definition on the subject. As we look into some of these different descriptions in this regard, Reinert (1976) stated that the learning style of an individual is the way by which that person is able to learn more effectively. To put it another way, the person can easily receive, understand, remember and use new information if s/he uses his/her own type of learning. Entwistle (1981) interpreted the learning style as the common predisposition to espouse a specific strategy. Keefe (1987) defined learning style as being a set of cognitive, emotional and physiological characteristics that behave as the indicators of how learners perceive, interact with and respond to the learning environment. On the other hand, Dunn and Dunn (1993) explained the learning style as the way allowing learners to focus on, to process and to retain the newly introduced information. Curry (1990) believes that there may be some sort of agreement emerging from the existing literature and suggests to use the term *learning style* to denote information processing routines that work like traits in personality. On the other hand, Kolb (1984) depicts learning styles as generalized differences in learning orientations based on the relative degree of emphasis placed by people on the four modes of the learning process as measured by a survey.

It is an attractive idea for teachers to be concentrated on learning styles of their students by determining the learning styles of the students, encouraging the students to represent their learning styles and forming the instructional environment according to their learning style differences (Coffield, Moseley, Hall, & Ecclestone, 2004). There are various learning style models, each of which suggests different conceptualizations and cathegorizations of learning styles, in the literature. The commonly held ones can be summarized as follows: Myers-Briggs Type Indicator helps researchers

classify each individual as one of the 16 personality types which are combinations of four dichotomous scales (Boyle, 1995): (i) *extraversion/introversion*, (ii) *sensing* (concrete)/*intuition* (abstract), (iii) *thinking* (logic) / *feeling* (values), and (iv) *judgment* (organized) / *perception* (flexible, easy-going). Gregorc's Learning Style model was based on concrete/abstract representation of perception and sequential/random view to order information resulting four orientations such as *concrete sequential*, *abstract random*, *concrete random*, and *abstract sequential* (Ekici, 2002). Grasha-Reichmann Student Learning Styles Model cathegorizes students in six different styles, which are avodaint, participant, independent, dependent, collaborative, and competitive (Grasha, 1990). Solomon-Felder Learning Style dimensions include *active/reflective*, *sensing/intuitive*, *visual/verbal*, *inductive/deductive*, and *sequential/global* (Felder, 1993). The Kolb Learning Style Inventory, which constitutes the theoretical base for this study, differs from other learning style approachs used in education by being based on a comprehensive theory of learning and development (Kolb, & Kolb, 2005).

Experiential learning theory (ELT) presents a different perspective from traditional instruction methods that are supported by the behaviorist approaches and rational idealist learning theories. This different perspective gives us various ideas about learning, studying and relationship between the activities and construction of knowledge (Kolb, 1984). ELT, identifies the education as constructing the knowledge by the change of experience. According to ELT, knowledge consists of grasping and changing the experience and it reflects the two grasping modes and two changing modes; concrete experience (CE), abstract conceptualization (AC) and reflective observation (RO), and active experience (AE) (Kolb, 1984). Even though these four modes are pieces of the learning process, individuals develop unique learning manner in time (Koob, & Funk, 2002). Kolb (1984) states that learning style preferences of the individuals are affected by heritage, life experience and necessity of the situation and there are weak and strong sides of every style. Learning style of the individual occurs by combining of these two learning prefences. According to Kolb's model, there are four different learning styles which are listed as accomodator, diverger, assimilator and converger. Accomodators who tend to be good at concrete experience and active experience learn by doing things. Divergers who are strong on concrete experience and reflective observation are dreamers and emotional. Assimilators are opposite of the accomodators and good at reflective observation and abstract conceptualization. Assimilators perceive their surroundings by symbols and transform these symbols into knowledge. Dominant learning modes of the convergers are abstract conceptualization and active experience. Convergers are unemotional and prefer to dwell on events rather than individuals (Smith, & Kolb, 1996). In order to determine the different learning modes and styles of the individuals that are defined in the experiential learning theory, Kolb has developed the Kolb Learning Styles Inventory (KLSI) in 1971 (Kolb, & Kolb, 2005).
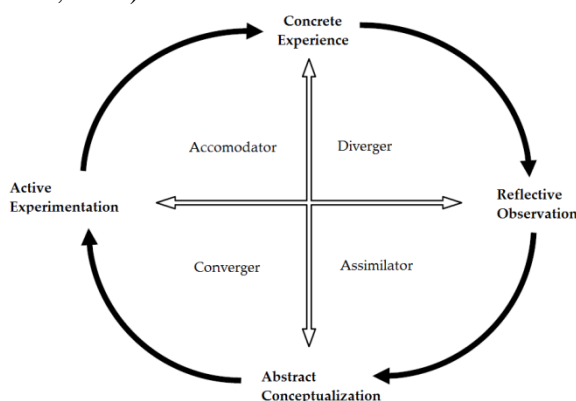

Figure 1. Kolb's Experimental Learning Theory

In the literature, KLSI have been used in large number of studies. Some of the recent studies reported that while the majority of the study group are divergers, convergers were the minority group (ALQahtani, & Al-Gahtani, 2014; Buaraphan, 2015; D'Amore, James, & Mitchell, 2012; Ghasemi et al., 2014); and if most of them were assimilators, than accomodators were the fewest among the participants (Brunton, 2015; Ghaffari, et al., 2013). Likewise, when the convergers prevail in the

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group, divergers are the least among participants (Gao, Au, Kwon, & Leong, 2013; Stagg, Jensen, Jorgensen, Olsen, & Pettey, 2015). In a recent study that investigates the learning styles of the students, results have shown that there is no statistically significant relationship between students' learning styles and their gender, gpa or specialty interest; however, while most of the freshman students were assimilators, they preferred the diverging style at the senior years (ALQahtani, & Al-Gahtani, 2014). In seperate studies with the students from different schools, Ghaffari et al. (2013) and Ghasemi et al. (2014) have reported that age is not the source of significant difference on learning styles of the students. In two different studies that conducted to determine the effect of cultural differences on students' learning styles revealed that native language and culture has a significant effect on learning styles of the students (D'Amore, James, & Mitchell, 2012; Gao et al., 2013). Buaraphan (2015) concluded that genders, grade levels, school sizes and the school regions were bringing about significant differences on learning styles of the students.

As the recent domestic studies have been reviewed, it draws attention that most of the research have been conducted with the faculty of education students. Among these studies, the ones that reporting diverging style as mostly dominant (Coşkun & Demirtaş, 2015; Çakır & Akbaş, 2013; Demir & Osmanoğlu, 2013; Ekici, 2013; Kayacık, 2013; Köroğlu, 2015; Turhan, 2015); and those reporting assimilators as the majority of the study group (Açışlı, 2016; Altun, 2015; Çelik, Yalçın, Gök Çatal, & Aydın, 2015; Durukan, 2013; Genç & Kocaarslan, 2013; Kurt et al., 2013; Özdemir & Kesten, 2012; Yanardöner Kiziltepe, Seggie, & Sekerler, 2014) were standing out. In some descriptive studies, gender had a significant effect on learning styles of the students (Çakır & Akbaş, 2013; Demir & Osmanoğlu, 2013; Ekici, 2013; Genç & Kocaarslan, 2013); while others suggested contradicting results (Coşkun & Demirtaş, 2015; Çelik et al., 2015; Turan, 2015; Turhan, 2015; Ünal, 2013; Yanardöner et al., 2014). While Can (2011), Özdemir and Kesten (2012) and Açışlı (2016) reported that grade level is the cause for significant differences; Çelik and Şahin (2011), Demir and Osmanoğlu (2013) and Turhan (2015) concluded that the learning styles of the students are of no significance regarding the grade level. Although a number of studies suggests that department of the students effects their learning styles (Çelik, et al., 2015; Genç & Kocaarslan, 2013; Ünal, 2013), other studies claim that there is no association between the department and learning styles of the students (Köroğlu, 2015; Şenyuva, 2009; Yanardöner et al., 2014). On the other hand, Seven, Bağcivan, Kılıç, and Açıkel, (2012) concluded that learning styles of the students were not affected by their parents' level of education.

Results of both domestic and foreign studies that have investigated the learning styles in terms of various variables, are quite different from each other, yielding that there is no consistency in the literature. Furthermore, studies seemingly mostly concentrated on the departments, genders and grade levels of the participants. Therefore, examining the frequently studied variables and the less often studied variables is considered to be valuable for the contributions to the literature. From this point of view, the purpose of this study is to designate the dominant learning styles among students, to determine the latitudinal variation of the learning styles across grade levels and to investigate the learning style profiles of the pre-service teachers with regard to various variables. In accordance with this purpose, relationships between learning styles of pre-service teachers and their grade level, department, gender, mother and father education level, field tendency and daily study time were investigated. Apart from the mostly included variables, which are department, gender and grade level, some other variables are thought likely to be related with the students' learning style preferences. As the parents bring up their children, they also guide them and help with their school work; hence the schooling of the parents may influence the childrens' learning styles. Also students' tendencies for the verbal or numerical based lessons may have an impact on their preferences, since these different kinds of lessons may require different study habits. In line with this, the amount of time students use to study may effect the choices of students for learning styles as different learning styles may require students to allocate different amounts of time. That's why these variables are taken into consideration within the present research.

METHOD

Research Design

This research has used survey design and investigated the interaction of learning styles of the pre-service teachers with various variables. Karasar (2015) defined survey design as a research approach describing the past or current sutiations as they are. This study has been designed using survey model, since it tried to depict the pre-service teachers' learning style preferences and their relationship with some other variables to reveal the existing situation.

Participants

Students in the faculty of education compose the target population of study. Purposeful sampling method has been used to choose the participants of the study. The study group consists of 382 students enrolled in faculty of education in a state university in western region of Black Sea. Sixteen invalid surveys were put aside since they are thought to be invalid and 366 of the students' survey results were analysed. Participants' demographic information is given in Table 1.

Table 1

Demographics of the Students

		n	*%*
Department	Elementary Education	150	42.5
	Primary Science Education	64	18.1
	Psychological Counselling and Guidance	105	29.7
	Turkish Language Education	34	9.6
Grade Level	1. grade	144	40.8
	2. grade	96	27.2
	3. grade	59	16.7
	4. grade	54	15.3
Gender	Female	279	79
	Male	74	21
Mother Education Level	Elementary/none	235	66.6
	Secondary	48	13.6
	High school	54	15.3
	College	16	4.5
Father Education Level	Elementary/None	134	38
	Secondary	73	20.7
	High School	89	25.2
	College	57	16.1
Field Tendecy*	Numeric	88	24.9
	Verbal	120	34
	Counterweighted	145	41.1
Daily Study Time	Less Than 2 Hours	209	59.2
	More Than 2 Hours	144	40.8

*Field tendency is used to imply students' inclinations towards the verbal or numerical types of courses.

Data Collection Tools

In order to collect data "Kolb Learning Style Inventory" and "Personal Information Form" have been used. Kolb Learning Style Inventory (KLSI), was developed by David Kolb in 1971, in order to determine the learning styles of individuals. KLSI consists of 12 short statements and each statement

has 4 different completion sentences. Participants should give points between 1 and 4 to these completion sentences according to their way of learning features and cumulative points of the 12 short statements are calculated. Each statement points vary between 12 and 48. Individuals' learning styles are determined by difference of the opposite learning modes' cumulative points. To put it in different way, difference between asbstract conceptualization and concrete experience points give the way of grasping of information and gap between reflective observation and active experience points give the way of processing information. Individuals' dominant learning styles are identified by marking the information grasping and processing scores on the chart of KLSI (Kolb, & Kolb, 2005). The inventory was adapted into Turkish by Aşkar and Akkoyunlu (1993). During adaptation procedures, Cronbach Alfa realibility co-efficient of the subscales were found between .88 and .73.

In order to identify the personal demographics of the participants, personal information form which consists of questions about department, grade level, education level of mother, education level of father, field tendencies and daily study time were used. In the form, variables that are thought to be effective on learning styles of the individuals were chosen.

Data Analysis

In the study, firstly demographics of the participants' frequency distribution, then frequency and percentage values of the students' dominant learning styles were stated. Relationships between demographic properties and learning styles of the students were analysed by Chi-square independence test. Chi-square independence test is used to determine whether there is a significant association between the two variables. If there is a significant association between the two variables, it means the level of first variable help you predict the level of other variable (Büyüköztürk, 2016). As Büyüköztürk (2016) suggested, since the cells that expected values less than 5 are more than 20%, converger column was defined as "missing value" and removed from the chi-square tests. In order to analyse the data SPSS 20.0 package program was used.

FINDINGS

In this section, distribution of the pre-service teachers' learning style preferences were examined and relationship between learning styles and grade level and other variables were presented. Since the examination of the latitudinal variation of pre-service teachers learning style preferences has been the main aim of the study, this will be firstly analyzed and presented within the findings. The relationship between the learning style preferences and other variables have been presented afterwards. Learning style preferences of the pre-service teachers are shown in Table 2.

Table 2
Pre-service Teachers' Learning Style Distributions

		n	*%*
	Divergers	208	56.8
Learning Style	Assimilators	103	28.1
	Accomodators	42	11.5
	Convergers	13	3.6
	Total	366	100

According to Table 2, 56.8% of the participants are divergers and 3.6% are convergers. Also, totally 84.9% of the participants consist of divergers and assimilators. As stated above, since the cells that expected values less than 5 are more than 20%, the surveys of students who have converging learning styles were removed from the subsequent analyses.

Results of the analysis for the relationship between grade level and learning styles are presented in Table 3.

Table 3
Results of the Chi-Square Test on Learning Styles According to Their Grade Level

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Grade Level	1	N	79	51	14	144
		%	54.9	35.4	9.7	100
	2	N	57	26	13	96
		%	59.4	27.1	13.5	100
	3	N	31	20	8	59
		%	52.5	33.9	13.6	100
	4	N	41	6	7	54
		%	75.9	11.1	13.0	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 3, while divergers in 1., 2., 3. grade level students rates were close (54.9, 59.4, 52.5); the percentage of fourth graders that have diverger learning style rate was 75.9%. Also, as in first three grade levels, students with assimilator learning style rate were similar, while fourth graders' percentage was lower. This difference is statistically significant according to the Chi-square test results (χ^2(df=6, n=353)=12.99, $p<.05$). In other words, there is a significant relationship between learning styles of the students and their grade level.

Results of the Phi Cramer's V test analysis towards investigation of the strength of the relationship between grade level and learning styles are presented in Table 4.

Table 4
Results of the Phi Cramer's V Test on the Strength of the Relationship Between Grade Level and Learning Styles

		Value	Approx. Sig.
Nominal by Nominal	Phi	.19	.04
	Cramer's V	.14	.04
N of Valid Cases		353	

According to Table 4, there is a weak relationship strength between grade level and learning styles (Cramer's V=.14).
Results of the analysis towards investigation of the relationship between department and learning styles are presented in Table 5.

Table 5
Results of the Chi-Square Test on Learning Styles According to Their Department

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Department	Elementary	N	97	36	17	150
		%	64.7	24	11.3	100
	Primary Science	N	35	19	10	64
		%	54.7	29.7	15.6	100
	Psychological Counseling and Guidance	N	61	33	11	105
		%	58.1	31.4	10.5	100
	Turkish Language	N	15	15	4	34
		%	44.1	44.1	11.8	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 5, 64.7% of the classroom teacher candidates, 58.1% of the psychological counseling and guidance teacher candidates and 54.7% of the science teacher candidates are divergers. Percentage of Turkish teacher candidates that are divergers and assimilators are equal by 44.1%. According to results of the analyses, pre-service teachers' learning styles and departments have no statistically significant relationship (χ^2=7.44, *p*>.05).

Results of the analysis towards investigation of the relationship between gender and learning styles are presented in Table 6.

Table 6
Results of the Chi-Square Test on Learning Styles According to Their Gender

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Gender	Female	N	166	81	32	279
		%	59.5	29	11.5	100
	Male	N	42	22	10	74
		%	56.8	29.7	13.5	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 6, 59.5% of the female and 56.8% of the male pre-service teachers are divergers, 29% of the female and 29.7% of the male pre-service teachers are assimilators. Pre-service teachers' learning styles and departments have no statistically significant relationship (χ^2=.29, *p*>.05).

Results of the analysis towards investigation of the relationship between education of their mother and learning styles are presented in Table 7.

Table 7
Results of the Chi-Square Test on Learning Styles According to Mother Education Level

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Mother Education Level	Primary S. /Illiterate	N	129	74	32	235
		%	54.9	31.5	13.6	100
	Secondary S.	N	34	13	1	48
		%	70.8	27.1	2.1	100
	High S.	N	37	12	5	54
		%	68.5	22.2	9.3	100
	College	N	8	4	4	16
		%	50	25	25	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 7, mothers of the most of the teacher candidates that are divergers graduated from secondary school (70.8%) and high school (68.5%). Mothers of the most of the teacher candidates that are assimilators are primary (31.5%) or secondary school (27.1%) graduates. Mothers of the most of the teacher candidates that are accomodators are college (25%) graduates. Pre-service teachers' learning styles and education level of their mothers have no statistically significant relationship (χ^2=11.45, *p*>.05).

Results of the analysis towards investigation of the relationship between education of their father and learning styles are presented in Table 8.

Table 8
Results of the Chi-Square Test on Learning Styles According to Father Education Level

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Father Education Level	Primary S. /Illiterate	N	72	42	20	134
		%	53.7	31.3	14.9	100
	Secondary S.	N	47	17	9	73
		%	64.4	23.3	12.3	100
	High S.	N	57	25	7	89
		%	64	28.1	7.9	100
	College	N	32	19	6	57
		%	56.1	33.3	10.5	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 8, fathers of the most of the teacher candidates that are divergers are secondary (64.4%) and high school (64%) graduates. Fathers of the most of the teacher candidates that are assimilators are primary school (31.3%) or college (33.3%) graduates. Fathers of the most of the teacher candidates that are accomodators are primary school (14.9%) graduates. Pre-service teachers' learning styles and education level of their fathers have no statistically significant relationship (χ^2=5.26, p>.05).
Results of the analysis towards investigation of the relationship between field tendencies and learning styles are presented in Table 9.

Table 9
Results of the Chi-Square Test on Learning Styles According to Their Field Tendency

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Field Tendency	Numeric	N	52	25	11	88
		%	59.1	28.4	12.5	100
	Verbal	N	63	42	15	120
		%	52.5	35	12.5	100
	Counterweighted	N	93	36	16	145
		%	64.1	24.8	11	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 9, percentage of divergers among numeric, verbal and counterweighted fields are 59.1%, 52.5% and 64.1% respectively. Pre-service teachers' learning styles and education field tendencies have no statistically significant relationship (χ^2=4.02, p>.05).
Results of the analysis toward investigation of the relationship between daily study time and learning styles are presented in Table 10.

Table 10
Results of the Chi-Square Test on Learning Styles According to Their Daily Study Time

			Learning Styles			
			Diverger	Assimilator	Accomodator	Total
Daily Study Time	Less Than 2 Hours	N	123	61	25	209
		%	58.9	29.2	12	100
	More Than 2 Hours	N	85	42	17	144
		%	59	29.2	11.8	100
Total		N	208	103	42	353
		%	58.9	29.2	11.9	100

According to Table 10, the proportion of the students studying less than and more than two hours is quite similar. Furthermore, pre-service teachers' learning styles and daily study time have no statistically significant relationship (χ^2=.00, p>.05).

CONCLUSION

This research aimed to study the relationships between the learning styles and grade levels, departments, genders, mother/father education level, field tendency, and daily study hours. The first level analyses showed that more than half of the students had learning style of diverger. The other learning styles can be sorted as assimilator, accommodator and converger respectively from the highest to the lowest number. The proportion of the students having learning style of converger is rather low compared to the others. This result makes sense in that Nulty and Barrett (1996) listed the disciplinary groups as applied economics, applied physics, art history, computing, demography, engineering, forestry, law and medical research and the sample group of this study has nothing to do with these profession groups. This finding is parallel with the results of some other studies (AlQahtani, & Al-Gahtani, 2013; D'Amore et al., 2012; Demir & Osmanoğlu, 2013; Ekici, 2013; Köroğlu, 2015; Turhan, 2015) in the literature.

An important finding of the study is that there is a weak relationship between the grade level and learning styles of the students. As is the case in the whole sample, most of the students in each of the all four grade levels have learning styles of diverger. This finding may be considered as meaningful since the students may have adopted the best fitting learning styles for themselves as passing the next grade. The undergraduate students should be responsible for their learning as they decide when, how, and how much to study on their own. This result coincides with some studies (Açışlı, 2016; Buaraphan, 2015; Can, 2011; Özdemir & Kesten, 2012), as well as it contradicts the other ones (Çelik & Şahin, 2011; Hasırcı, 2006; Şenyuva, 2009; Turhan, 2015). The difference between the grade levels may be considered as normal, since it is likely for them to be more conscious to select and adapt their study habits in the upper grades. Taking into consideration the fact that every organization has its own unique culture, the differences among the studies may be thought as usual.

No relationships have been found between the learning styles and departments, field tendency, daily study hours, genders, mother and father education levels of the students. These results are similar to most of the studies in the literature, while they differ from some other studies. Relationships have not been found between the learning styles and department (Köroğlu, 2015; Şenyuva, 2009; Yanardöner, et al., 2014), gender (AlQahtani, & Al-Gahtani, 2013; Can, 2011; Coşkun & Demirtaş, 2015; Çelik & Şahin, 2011; Demir, 2006; Turhan, 2015; Yanardöner, et al., 2014), mother education level (Seven, et al., 2012) and father education level (Köroğlu, 2015; Seven, et al., 2012). On the other hand, relationships have been revealed between learning style and department (Çelik, et al., 2014; Genç, & Kocaarslan, 2013; Ünal, 2013) and gender (Buaraphan, 2015; Çakır, & Akbaş, 2013; D'Amore et al., 2012; Demir, & Osmanoğlu, 2013; Ekici, 2013; Genç, & Kocaarslan, 2013).

According to the categorization of learning styles by Nulty and Barrett (1996), the occupations of verbal fields such as commerce, education, geography and political science fell in the accommodators and verbal fields such as linguistics, history, philosophy and sociology fell in divergers. On the other hand, the numerical fields such as applied physics, computing, engineering, and medical research fell in convergers and chemistry, earth sciences, economics, mathematics, and physics fell in assimilators. Hence, there is no sharp distinction among the learning styles according to the verbal/numerical field types and departments of preservice teachers in this study. Accordingly, further studies are suggested to examine the relationships between the learning styles and departments of all the faculties within the universities. As for the relationship between the gender and learning styles, it has been claimed that the gender differences is quite a controversial issue in educational field (Ercikan, McCreith, & Lapointe, 2005; Leahey, & Guo, 2001). Most of the students whose parents' education levels are secondary school and high school have learning styles of diverger, although there is no relationship between the learning styles and parents' education levels. The distribution of the learning style preferences is quite similar according to the mother and father education levels. The non-relationship between the parents' education level and learning styles may be the result of the fact that students' own choices are indicative for the learning style preferences at the undergraduate level

as they have more independence and autonomy, while parents' guidance may be determinative on the choices of students at lower school levels where students are more dependent on the parents (Miller, 2011). Although Kuo and Hauser (1995) reported that parental schooling impacts the educational attainment of students, parents may not be so effective on the individual preferences of the students such as learning styles or study habits. The amount of daily study hours also has no relationship with the learning styles. This may be the usual case as well as it may be the result of cut point we have used for determining the daily study hours as lower/higher than 2 hours. The determined cut point may not be powerful enough to reveal the differences of learning style preferences. Furthermore, it can be claimed that the learning style preferences can be associated to the study habits and strategies rather than to the duration of the study.

This study adds to the literature in that it questions consistency among the previous results of the studies. It may be suggested that new studies may be conducted using more variables to reveal different relationships and different data collection tools such as qualitative ones to shed light on these relationships. The researchers may even conduct studies using different learning style inventories at the same time to question the conflicting results existing in the literature. Furthermore, the practitioners may take into consideration the learning styles of the students, especially in different grade levels. Although the found relationship seems to be weak, it still helps us understand the students' study habits and learning style preferences.

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